

IAP12 Rec'd PCT/PTO 19 MAY 2006

Title: : ELECTRIC EQUIPMENT  
Patent No. : JP 8329731  
Publication Date : 13. December. 1996  
Application No. : JP 19950134552  
Filing Date : 31. May. 1995  
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### ABSTRACT

PURPOSE: To provide an electric equipment mounted with a circuit board related to the arrangement of a circuit part uninfluenced by a heating part by installing the circuit board by dividing it into a heating part and an unheated part by a hybrid IC as a boundary.

CONSTITUTION: In a circuit board 30, the right side is partitioned and formed as a heating part installing surface 2, and the left side is partitioned and formed as an unheated part installing surface 3, and it is partitioned and formed by a hybrid IC 35. The IC 35 is mounted vertically to the warping direction of the board 30, and is almost fully installed in the width direction of the board 30. The board 30 mounted with this IC 35 is fixed to a bottom case 6 by a screw through a pipe-shaped spacer composed of insulating material. The shape of a outer case 1 of the IC 35 mounted on the board 30 is formed in a shape almost approximate to a cover 5 and the inside surface of a case 6.

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Bibliography

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- (19) [Publication country] Japan Patent Office (JP)
- (12) [Kind of official gazette] Open patent official report (A)
- (11) [Publication No.] JP,8-329731,A
- (43) [Date of Publication] December 13, Heisei 8 (1996)
- (54) [Title of the Invention] Electrical machinery and apparatus
- (51) [International Patent Classification (6th Edition)]

F21V 29/00

[FI]

F21V 29/00            A

[Request for Examination] Un-asking.

[The number of claims] 1

[Mode of Application] OL

[Number of Pages] 3

(21) [Application number] Japanese Patent Application No. 7-134552

(22) [Filing date] May 31, Heisei 7 (1995)

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## Epitome

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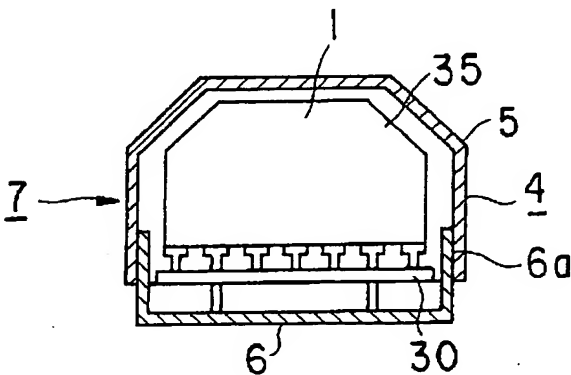
### (57) [Abstract]

[Objects of the Invention] This invention aims at offering the electrical machinery and apparatus which carried the circuit board concerning arrangement of the passive circuit elements which are not influenced of exoergic components.

[Elements of the Invention] In the electrical machinery and apparatus equipped with the circuit board 30 in which high Brit IC 35, passive circuit elements, etc. which are contained in a case 4 and this case 4 were carried to said circuit board 30 While high Brit IC 35 is perpendicularly mounted to the direction of camber of a substrate 30 Passive circuit elements classify the exoergic components 20 and the non-generating heat components 21 bordering on said high Brit IC 35, respectively, and are carried, and it is characterized by for the inside cross-section configuration having made said case 4 approximate to said high Brit's IC outline configuration 1, and forming it.

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## CLAIMS

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### [Claim(s)]

[Claim 1] Case The circuit board in which high Brit IC, passive circuit elements, etc. which are

contained in this case were carried the electrical machinery and apparatus equipped with the above -- it is -- said circuit board -- the direction of camber of a substrate -- receiving -- perpendicular -- yes -- while Brit IC is mounted -- passive circuit elements -- exoergic components and non-generating heat components -- said -- yes, bordering on Brit IC, it classifies, respectively and carries -- having -- said case -- an inside cross-section configuration -- said -- yes, it is characterized by having made Brit's IC outline configuration resemble and being formed.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the electrical machinery and apparatus which carried high Brit IC etc.

[0002]

[Description of the Prior Art] The circuit board in which passive circuit elements, such as conventional high Brit IC, were carried is shown in drawing 5 .

[0003] the components 31 which generate heat by energization on the circuit board 30 (henceforth "exoergic components"), for example, a transformer, and the components 32 with little the transistor 33 with a heat sink and generation of heat (henceforth "non-generating heat components"), for example, a film capacitor, and an electrolytic capacitor 34 -- yes, Brit IC 35 was intermingled and was attached.

[0004]

[Problem(s) to be Solved by the Invention] As mentioned above, temperature rises with the heat which the film capacitor which are the non-generating heat components which approach the transformer which are exoergic components, for example, and are attached in the circuit board generates from exoergic components.

[0005] For this reason, the film capacitor caused heat deterioration, the life might become short and the engine performance might change.

[0006] Then, expensive reliable components needed to be used for the passive circuit elements close to exoergic components, and they had the problem that cost rose.

[0007] This invention was not made in view of the above-mentioned point, and aims at offering the electrical machinery and apparatus which carried the circuit board concerning arrangement of the passive circuit elements which are not influenced of exoergic components.

[0008]

[Means for Solving the Problem] In order to attain said purpose, the electrical machinery and apparatus of this invention In the electrical machinery and apparatus equipped with the circuit board in which high Brit IC, passive circuit elements, etc. which are contained in a case and this case were carried to said circuit board While high Brit IC is perpendicularly mounted to the direction of camber of a substrate Passive circuit elements classify exoergic components and

non-generating heat components bordering on said high Brit IC, respectively, and are carried, and it is characterized by for the inside cross-section configuration having made said case approximate to said high Brit's IC outline configuration, and forming it.

[0009]

[Function] In the above-mentioned configuration, the inside cross-section configuration of the case which surrounds high Brit IC was made to approximate to the configuration of high Brit's IC outline case, and it formed, it classified into exoergic components and non-generating heat components bordering on this high Brit IC, and attached in the circuit board.

[0010] For this reason, the thermal shield of the heat generated from exoergic components is carried out in the outline case as high Brit's IC outline configuration, and it stops easily being able to receive effect by the heat generated from exoergic components.

[0011]

[Example] Hereafter, the example of this invention is explained with reference to drawing 1 thru/or drawing 4. In addition, the same configuration as the conventional technique gives and explains the same number.

[0012] High Brit IC 35 who consists of an outline case 1 which the electrical machinery and apparatus 7 has been arranged about one cup of crosswise [ of the circuit board 30 arranged inside the case 4 which contains the circuit board 30 in which passive circuit elements were carried as shown in drawing 1, and this case 4 ], and carried out the abbreviation rectangle is attached.

[0013] It consists of an aluminum plate, and a case 4 consists of a bottom case 6 of the shape of a case in which the whole surface carried out opening in covering 5 and the rectangle of the shape of a case in which is a rectangle and the whole surface carried out opening, joins covering 5 to side-face 6a of the bottom case 6, respectively, and it is attached.

[0014] As shown in drawing 2, right-hand side is carried out in the exoergic components clamp face 2, partition formation of the left-hand side is carried out in the non-generating heat components clamp face 3, and partition formation of the circuit board 30 is done by high Brit IC 35.

[0015] The transistor 33 with the heat sink with which the radiator material which is the switching device of an inverter was attached in the electric-discharge lamp lighting device by the inverter circuit and resonance transformer 31 grade which are the exoergic components 20 are attached in the exoergic components clamp face 2.

[0016] The non-generating heat components 21 34 with little calorific value which are components, for example, the electrolytic capacitor of a smoothing circuit, and the film capacitor 32 grade for resonance are attached in the non-generating heat components clamp face 3.

[0017] The circuit board 30 in which 35 is high Brit IC attached about one cup of crosswise [ of the circuit board 30 ] while being perpendicularly mounted to the direction of camber of a substrate, as shown in drawing 2, and this high Brit IC 35 was carried has fixed in the bottom case 6 according to \*\*\*\* through the spacer of the shape of a pipe which consists of an insulating material which is not illustrated. The configuration of high Brit's IC 35 outline case 1 carried in the circuit board 30 is formed in the inside of covering 5 and the bottom case 6, and the configuration approximated mostly.

[0018] As reference, high Brit's IC general appearance configuration and general internal structure are shown ( drawing 3, 4).

[0019] Yes, Brit IC mixes a capacitor 13, resistance 15, and transistor 14 grade, equips the direct substrate 16, covers this in the outline case 1 as an outline configuration which consists of an ingredient made of an epoxy resin which has thermal resistance, makes many terminals 11 project on a base, and prepares in it so that it may be shown in the components of two or more different classes, for example, drawing 4.

[0020] Next, an operation of the above-mentioned example is explained.

[0021] Yes, the inside cross-section configuration of the case which surrounds Brit IC was made to approximate to the configuration of high Brit's IC outline case, was formed, was classified into exoergic passive circuit elements and non-generating heat passive circuit elements bordering on this high Brit IC, and was attached in the circuit board.

[0022] For this reason, direct intermediary straw does not have the heat generated from exoergic components in the substrate side in which the thermal shield was carried out in the outline case formed from the ingredient with high Brit's IC thermal resistance, and non-generating heat passive circuit elements were carried.

[0023] Then, it is hard coming to receive the effect by the heat generated from circuit exoergic components, and the temperature rise of non-generating heat components can be reduced.

[0024] For this reason, dependability — the life of non-generating heat components becomes long — improves. Furthermore, it is not necessary to use expensive reliable non-generating heat components, a cheap commercial item can be used, and cost reduction can be planned.

[0025] Furthermore, since high Brit IC was perpendicularly mounted to the direction of camber of a substrate, the camber of a substrate can be prevented.

[0026]

[Effect of the Invention] Since high Brit IC has a function as a thermal shield object to heat dissipation of exoergic components according to this invention as a full account was given above, the temperature rise of non-generating heat components can be reduced and the dependability of non-generating heat components improves.

[0027] Furthermore, a cheap commercial item can be used and cost reduction can be planned.

[0028] Moreover, since high Brit IC was perpendicularly mounted to the direction of camber of a substrate, the camber of a substrate can be prevented.

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#### DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The sectional view showing the electrical machinery and apparatus concerning one example of this invention.

[Drawing 2] The plan showing the circuit board in which high Brit IC in this example was carried.

[Drawing 3] It is a perspective view about high Brit's IC appearance in this example.

[Drawing 4] High Brit's IC sectional view in this example.

[Drawing 5] The plan showing the circuit board in which high Brit IC in the conventional technique was carried.

[Description of Notations]

1 -- High Brit's IC outline case (yes, Brit's IC outline configuration),

4 -- Case,

20 -- Exoergic components,

21 -- Non-generating heat components,

30 -- Circuit board,

35 -- High Brit IC.

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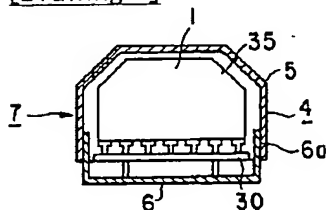
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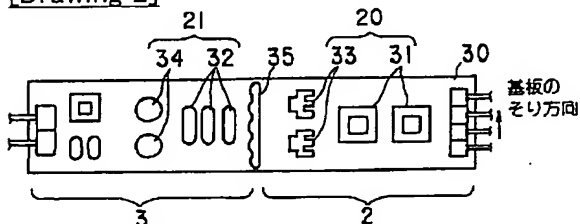
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## DRAWINGS

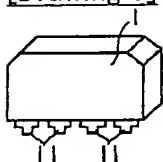
[Drawing 1]



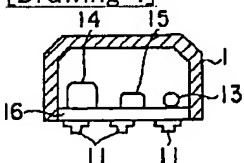
[Drawing 2]



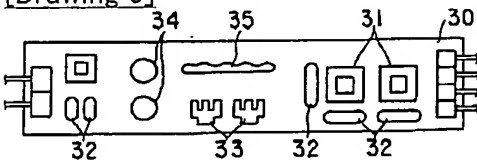
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Translation done.]

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開平8-329731

(43) 公開日 平成 8 年 (1996) 12月13日

(51) Int.Cl.<sup>6</sup>

F 2 1 V 29/00

識別記号

庁内整理番号

F I

F 2 1 V 29/00

技術表示箇所

A

審査請求 未請求 請求項の数 1 O L (全 3 頁)

(21) 出願番号 特願平7-134552

(22) 出願日 平成 7 年 (1995) 5 月 31 日

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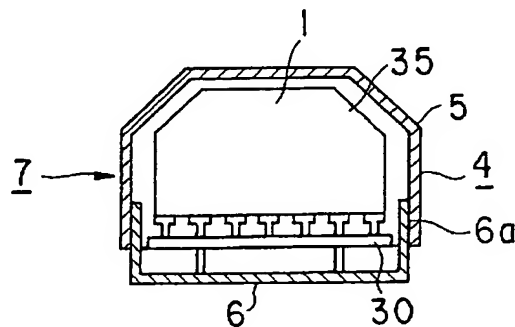
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(54) 【発明の名称】 電気機器

(57) 【要約】

【目的】 本発明は、発熱部品の影響を受けない回路部品の配置に係る回路基板を搭載した電気機器を提供することを目的とする。

【構成】 ケース 4 と、このケース 4 内に収納されるハイブリット IC 35 および回路部品等を搭載した回路基板 30 を備えた電気機器において、前記回路基板 30 には、基板 30 のそり方向に対して垂直にハイブリット IC 35 が実装されるとともに、回路部品が発熱部品 20 と非発熱部品 21 とを前記ハイブリット IC 35 を境にしてそれぞれ区分して搭載され、前記ケース 4 は内側断面形状が前記ハイブリット IC の外郭形状 1 に近似させて形成されたことを特徴とする。





## 【特許請求の範囲】

## 【請求項 1】 ケースと、

このケース内に収納されるハイブリット IC および回路部品等を搭載した回路基板を備えた電気機器において、前記回路基板には、基板のそり方向に対して垂直にハイブリット IC が実装されるとともに、回路部品が発熱部品と非発熱部品とを前記ハイブリット IC を境にしてそれぞれ区分して搭載され、前記ケースは内側断面形状が前記ハイブリット IC の外郭形状に近似させて形成されたことを特徴とする電気機器。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 本発明は、ハイブリット IC 等を搭載した電気機器に関する。

## 【0002】

【従来の技術】 従来のハイブリット IC 等の回路部品を搭載した回路基板を図 5 に示す。

【0003】 回路基板 30 上には、通電により発熱する部品（以下「発熱部品」という）、例えば、トランス 31、ヒートシンク付トランジスタ 33 と発熱の少ない部品（以下「非発熱部品」という）、例えば、フィルムコンデンサ 32、電解コンデンサ 34、ハイブリット IC 35 が混在して取付けられていた。

## 【0004】

【発明が解決しようとする課題】 上記のように、例えば、発熱部品であるトランスに近接して回路基板に取付けられている非発熱部品であるフィルムコンデンサは、発熱部品から発生する熱により温度が上昇する。

【0005】 このため、フィルムコンデンサは熱劣化をおこし、寿命が短くなったり、性能が変化することがあった。

【0006】 そこで、発熱部品に近接する回路部品は、信頼性の高い高価な部品を使う必要があり、コストがアップするという問題があった。

【0007】 本発明は上記の点に鑑みてなされたもので、発熱部品の影響を受けない回路部品の配置に係る回路基板を搭載した電気機器を提供することを目的とする。

## 【0008】

【課題を解決するための手段】 前記目的を達成するために、本発明の電気機器は、ケースと、このケース内に収納されるハイブリット IC および回路部品等を搭載した回路基板を備えた電気機器において、前記回路基板には、基板のそり方向に対して垂直にハイブリット IC が実装されるとともに、回路部品が発熱部品と非発熱部品とを前記ハイブリット IC を境にしてそれぞれ区分して搭載され、前記ケースは内側断面形状が前記ハイブリット IC の外郭形状に近似させて形成されたことを特徴とする。

## 【0009】

【作用】 上記の構成において、ハイブリット IC を包囲するケースの内側断面形状をハイブリット IC の外郭ケースの形状に近似させて形成し、このハイブリット IC を境にして、発熱部品と非発熱部品とに区分して回路基板に取付けた。

【0010】 このため、発熱部品から発生する熱は、ハイブリット IC の外郭形状としての外郭ケースにより熱遮蔽され、発熱部品から発生する熱による影響をうけにくくなる。

## 【0011】

【実施例】 以下、図 1 ないし図 4 を参照して本発明の実施例を説明する。なお、従来技術と同一の構成は同一番号を付与して説明する。

【0012】 電気機器 7 は、図 1 に示すように、回路部品を搭載した回路基板 30 を収納するケース 4 とこのケース 4 の内側に配置された回路基板 30 の幅方向はほぼ一杯に配置されて略長方形をした外郭ケース 1 からなるハイブリット IC 35 が取付けられている。

【0013】 ケース 4 は、例えば、アルミ板材からなり、長方形で、一面が開口した筐体状のカバー 5 と長方形で一面が開口した筐体状の底ケース 6 とからなり、カバー 5 は底ケース 6 の側面 6a とそれぞれ接合して取付けられている。

【0014】 回路基板 30 は、図 2 に示すように、右側は発熱部品取付面 2、左側は非発熱部品取付面 3 とに区画形成され、ハイブリット IC 35 により区画形成されている。

【0015】 発熱部品取付面 2 には、発熱部品 20 である、例えば、インバータ回路による放電灯点灯装置においては、インバータのスイッチ素子である放熱部材が取付けられたヒートシンク付トランジスタ 33 や共振トランス 31 等が取付けられている。

【0016】 非発熱部品取付面 3 には、発熱量の少ない部品である非発熱部品 21、例えば、平滑回路の電解コンデンサ 34 や共振用フィルムコンデンサ 32 等が取付けられている。

【0017】 35 は、図 2 に示すように、基板のそり方向に対して垂直に実装されるとともに、回路基板 30 の幅方向はほぼ一杯に取付けられたハイブリット IC で、このハイブリット IC 35 を搭載した回路基板 30 は、図示しない絶縁材料からなるパイプ状のスペーサを介してねじにより、底ケース 6 に固着されている。回路基板 30 に搭載されたハイブリット IC 35 の外郭ケース 1 の形状は、カバー 5 および底ケース 6 の内面とほぼ近似した形状に形成されている。

【0018】 参考として、ハイブリット IC の一般的な外観形状および内部構造を示す（図 3、4）。

【0019】 ハイブリット IC は、2 以上の異なった種類の部品、例えば、図 4 に示すように、コンデンサ 1

3、抵抗15およびトランジスタ14等を混成して、直接基板16に装着し、これを耐熱性を有するエポキシ樹脂製の材料からなる外郭形状としての外郭ケース1で覆い、底面に多数の端子11を突出させて設けたものである。

【0020】次に上記実施例の作用を説明する。

【0021】ハイブリットICを包囲するケースの内側断面形状は、ハイブリットICの外郭ケースの形状に近似させて形成し、このハイブリットICを境にして、発熱回路部品と非発熱回路部品とに区分して回路基板に取

10 付けた。  
【0022】このため、発熱部品から発生した熱は、ハイブリットICの耐熱性のある材料から形成された外郭ケースにより熱遮蔽され、非発熱回路部品が搭載された基板側に直接伝わらない。

【0023】そこで、回路発熱部品から発生する熱による影響をうけにくくなり、非発熱部品の温度上昇を低減できる。

【0024】このため、非発熱部品の寿命が長くなる等信頼性が向上する。さらに、信頼性の高い高価な非発熱部品を使う必要もなく、安い市販品を使用でき、コスト低減を図ることができる。

【0025】さらに、基板のそり方向に対して垂直にハイブリットICを実装したので、基板のそりを防止することができる。

【0026】

【発明の効果】以上詳記したように本発明によれば、ハ \*

ミブリットICが、発熱部品の放熱に対する熱遮蔽物としての機能を有するため、非発熱部品の温度上昇を低減でき、非発熱部品の信頼性が向上する。

【0027】さらに、安い市販品を使用でき、コスト低減を図ることができる。

【0028】また、基板のそり方向に対して垂直にハイブリットICを実装したので、基板のそりを防止することができる。

【図面の簡単な説明】

【図1】本発明の一実施例に係る電気機器を示す断面図。

【図2】同実施例におけるハイブリットICを搭載した回路基板を示す上面図。

【図3】同実施例におけるハイブリットICの外形を斜視図。

【図4】同実施例におけるハイブリットICの断面図。

【図5】従来技術におけるハイブリットICを搭載した回路基板を示す上面図。

【符号の説明】

1…ハイブリットICの外郭ケース（ハイブリットICの外郭形状）、

4…ケース、

20…発熱部品、

21…非発熱部品、

30…回路基板、

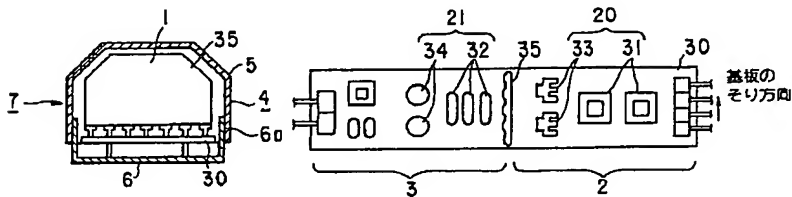
35…ハイブリットIC。

【図1】

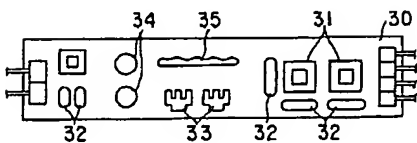
【図2】

【図3】

【図4】



【図5】



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